

# Interactive Pong: Learning and Practicing Interaction Design through Interactive Prototyping

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## ABSTRACT

With interaction design being introduced at the Beijing University of Technology, for the first time interactive prototyping skills become important for their students to learn and practice. This study aims to demonstrate novel user-product interactions by prototyping interactive input devices to play the classical computer game Pong. In an interactive prototyping workshop twelve prototypes were built and experienced. From these prototypes, experiences for initiating interaction design program based on traditional industrial design education were discussed.

## Author Keywords

Interaction Design, Interactive Prototyping.

## ACM Classification Keywords

H.5.2 [User Interfaces]: Prototyping.

## General Terms

Design.

## INTRODUCTION

Being educated as industrial designers, the design students at the Beijing University of Technology are used to and are good at crafting physical car models, designing graphical illustrations and making Chinese porcelains. However, interaction design, specifically interactive prototyping will play a crucial role in their educational curriculums in the coming years. In order to improve the fit, we organized an interactive technology design workshop with experts from the Delft University of Technology. The goal was to help the students learn and practice interactive prototyping skills by developing interactive and working prototypes.

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## RESEARCH APPROACH

The workshop took place in the Industrial Design program at the College of Architecture and Urban Planning at the Beijing University of Technology. This workshop aimed to let their students gain practical experience in the development of products, which utilize potentials of embedded ubiquitous technology in products in terms of enriching user experience [1,5]. The workshop lasted for ten days in spring 2012. We mentored forty-five bachelor and twelve master students, who worked in teams of four or five on a design brief concerning interactive Pong.

A total of three iterations of concept and prototype development were made. The first iteration focused on understanding interaction design and exploring conceptual possibilities. The second iteration targeted on developing concepts through brainstorming and storyboarding. We asked the students to make storyboards first and try their games though playacting. Each group went through two to three rounds of conceptualization before building the final prototype. The third iteration aimed to tackle technological problems and to build final prototypes. Some groups even managed to present with video scenarios.

Max/MSP and Phidgets were selected together [3,4], these tools make it possible to make experiential prototypes even with students who have few electrical and programming skills. In addition, we provided a completely working setup from Max/MSP to a Pong game in Processing so the students could quickly start with exploring the game.

## Design Assignment

The design assignment stated that each team had to use the classical computer game Pong to create a specific scenario and to explore qualities of interaction [2] and the Phidgets sensors. To do so, they had to build experiential prototypes as input devices to play Pong, going through several rounds of improvements.

## INTERACTIVE PROTOTYPING

Twelve interactive prototypes were built for experiencing the interactive Pong. Below are two typical prototypes.

### The Exercise Pong

This prototype enables users to exercise and play Pong at the same time (see Figure 1 and 2). The prototype has a disk interface on top and two handles aside. The disk can perform 90-degree rotation. In order to control the digital paddle in the Pong game on-screen, the user has to step on the disk and twist his waist to adjust rotation angle. When rotating the disk clockwise, the digital paddle moves down. When rotating the disk counter-clockwise, the paddle moves up. The user interactions include grasping handles with both hands, stepping on top of the disk, twisting waist to adjust angle and watching the paddle movement. Accelerometer and gravity sensors were used in this design. A corresponding video scenario can be found at [http://v.youku.com/v\\_show/id\\_XMzkzODMzMDY4.html](http://v.youku.com/v_show/id_XMzkzODMzMDY4.html).

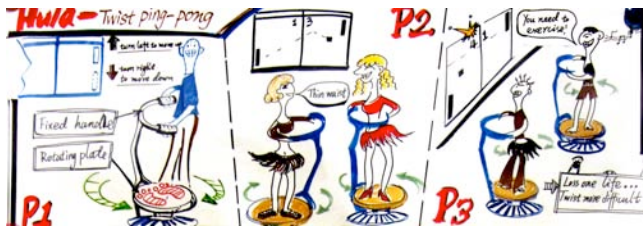


Figure 1. The storyboard of using twist action to play the classical Pong game.



Figure 2. The design, making and user test of the Exercise Pong.

### The Crazy Bunny

This prototype puts two user opponents into a scenario (see Figure 3). They discover two large carrots in the ground. Each user holds a carrot as token. In order to control the digital paddle in the Pong game on-screen, each user has to pull or push a carrot and adjust the distance and force. When pulling the carrot hard towards the user, the digital paddle moves up rapidly. When pushing the carrot softly towards the ground, the digital paddle moves down gently. The user interactions include holding the carrot with one or both hands, pushing or pulling to adjust distance and force, and watching the paddle movement. Light and force sensors were used in this design.



Figure 3. The design and user test of the Crazy Bunny.

## DISCUSSION

Both prototypes show promise by providing novel user interactions - that is the power of making experiential prototypes. From working on the design assignment, the students understand that user, context and action are the key elements of interaction design. They designed and tried out various ways of interacting with Pong. Pong is a good mean to learn and practice interactive prototyping skills in an engaging way. With skills, students can design and build more interactive prototypes in other domains. The limitations of this workshop include the short amount of time, insufficient knowledge on interaction design from the students and lack of comprehensive user tests.

## CONCLUSION

In this paper, we have presented that designing and prototyping interactive Pong successfully promoted the students to learn and practice interactive prototyping skills. Twelve prototypes were built, each demonstrating novel user-product interactions. The experience with this workshop continuously promotes and drives the initiation of interaction design program based on traditional industrial design education at the Beijing University of Technology. In order to accumulate experience on interaction design education, the next step is to conduct more prototyping studies on the incoming research projects within the college, to run user tests and to set a curriculum syllabus.

## ACKNOWLEDGMENTS

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